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## Introduction – ICC EV Charging Station Installer Certification

Electric Vehicle Supply Equipment (EVSE) is covered under the National Electrical Code (NEC) and the Chicago Electrical Code. These documents provide for the safe installation of all equipment and electrical loads in residential, commercial and industrial locations. They are not design documents, but rather safety documents defining terms, conductor sizes, raceways, overcurrent devices, grounding and bonding, service calculations, feeder sizes and other important considerations. EVSE or charging stations are specifically referenced in Article 625 of the NEC, and other NEC articles apply to various parts of the electrical installation.

Until recently, the emphasis has been on the development of the electric vehicle and evolving battery technology. The wiring infrastructure whether in residential or commercial setting is now being viewed as critical to the success of this developing industry. The electrical code (NEC) is the standard for this infrastructure.

The design and installation of a charger should be performed by a qualified person. The electrician is qualified to install since he/she has the “skills and knowledge related to the construction and operation of the electrical equipment and installation and has received safety training to recognize and avoid the hazards involved”. Electricians must follow the NEC, NFPA 70E, applicable state or municipal codes and manufacturer’s instructions. The electrician is responsible for assessing adequate service ampacity, conductor ampacity and other technical requirements to ensure the safe operation of these systems. Improper electrical installation or inadequate electrical understanding and overview may lead to unintended negative consequences. Therefore, the experience and training of the electrician/installer is paramount.

An example of inadequate electrical understanding is the description of charging stations as a hair drier type electrical load. EVSE is considered a continuous load by the NEC and requires a larger conductor size than may be indicated on the equipment nameplate. In a residential situation an EVSE may charge a vehicle for 10 to 12 hours clearly surpassing the 3 hour threshold for continuous load designation. Excessive heat over time may lead to fires or faults as in any improperly installed electrical device. Excessive voltage drop as another example may of inadequate electrical understanding resulting in malfunctioning charging stations and dangerous arcing conditions. Qualified electricians/installers are well aware of the ramifications of electrical theory and code misapplication.

Residential chargers require the same electrical knowledge base as commercial chargers. A site assessment must be done in all installations to verify electrical service capacity and overcurrent device availability. Indiscriminately plugging a level 1 charger into any available outlet may result in an overloaded circuit tripping the fuse or circuit breaker. Overloaded circuits are clearly responsible every year for numerous fires, property damage and death. A qualified electrician fully comprehends not only the theory but the practicality of a well designed and installed charging system.

Certification acts as insurance against dangerous electrical situations. This certification should apply to all types and levels of charging stations. These include residential, level 1 through commercial, level 2 and quick charge level 3.

A certification curriculum, Electric Vehicle Infrastructure Training Program (EVITP) has already been implemented nationwide. This program is referenced by the United States Department of Energy in the Clean Cities Plug – In Electric Vehicle Handbook. Hundreds of electricians have successfully completed the 30 hour class combining classroom and lab sections. The fourteen sections address stakeholder concerns such as EV codes and safety, EV standards, site assessment, electrical load calculations, utility issues, permitting process, customer relations, first responders and others.

The EVITP curriculum enhances the existing skill set and experience the electrician already possesses both educationally and practically. Electricians entering the program must meet reasonable prerequisites ensuring the proper knowledge base initially. Short term coursework does not ensure a qualified person under the OSHA definition, or satisfy the needs of the marketplace for experienced electricians

Governor Quinn, the ICC, and the Illinois Electric Vehicle Advisory Council are to be commended for the implementation of a new industry standard and the safe installation of electrical infrastructure in Illinois.

Answers to questions posed by the Illinois Commerce Commission follow in greater detail.

## **I. Definitions**

1.) What definition, if any, should be included in the rule to define an “electric vehicle charging station”?

It is industry practice as well as the National Electric Code and other industry standards to identify “electric vehicle charging stations” as “Electric Vehicle Supply Equipment”(EVSE).

NEC 625.2 defines Electric Vehicle Supply Equipment as, “the conductors, including the ungrounded, grounded, and equipment grounding conductors and the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle”.

2.) What definition, if any, should be included in the rule to define a “vendor that installs an electric vehicle charging station? Can a single individual be classified as a “vendor”?

Installing electric vehicle supply equipment is an electrical installation. All electrical installations are installed to a minimum electrical standard referred to as the National Electric Code (NEC).

The correct terminology for the electrical installer is not “vendor” but should be classified as a “qualified person”. A vendor will be the entity selling the electrical vehicle supply equipment. A single individual can be classified as a qualified person if they meet the requirements of the NEC.

NEC Article 100 defines Qualified Person as, “one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received training to recognize and avoid the hazards involved”. Electrician/installers are qualified if they met this criteria through classroom training and field experience.

Informational Note: Refer to NFPA 70E-2008, Standard for *Electrical Safety in the Workplace*, for electrical safety requirements.

3.) What definition, if any, should be included in the rule to define “self-installer” of electric vehicle charging station? Does a self-installer fall under the definition of “vendor”?

A “self-installer” is not referenced in the NEC or other standards or documentation. Refer to the statement above regarding “qualified” for clarification.

4.) What definition, if any, should be included in the rule to define “install”? Does plugging a charging station cord into an outlet on the premises constitute “installing an electric vehicle charging station”?

When installing electric vehicle charging stations, the qualified person adheres to the requirements of the National Electric Code containing provisions for safeguarding persons and property from hazards arising from the use of electricity. The qualified person will “install” the electrical equipment such as conduit, conductors, overcurrent protection devices and other electrical equipment related to the electric vehicle supply equipment circuit.

Plugging the residential electric vehicle supply equipment into a receptacle outlet for either Level 1 or Level 2 should not be considered “installing” the electrical components of the electric vehicle supply equipment.

5.) What definitions, if any, should be included in the rule to define “commercial use” of an electric vehicle charging station? Does commercial encompass only those installations that offer services to the public? Would the definition include use of charging stations owned by a fleet owner for limited purposes of charging its own fleet vehicles?

Commercial Electric Vehicle Supply equipment installation shall be any electric vehicle supply equipment installation other than dwelling unit (single-family, two-family, and multi-family).

Public charging and commercial fleet charging would be two examples of commercial EVSE installations. EVSE installations of any level are governed by the NEC.

6.) What other definitions, not mentioned above, should be included in the rule?

Since electrical vehicle supply equipment is an electrical installation, the definitions in the National Electrical Code, Article 100 should be referenced.

## **II. Applicability**

1.) Should the Commission certify all vendors that install electric vehicle charging stations?

The electrician/installer must be “qualified” as per the NEC. The vendor must employ certified electrician/installers and maintain proof of such. Vendors who also provide installation must be licensed electrical contractors as per the NEC. The Commission may also require vendor certification.

2.) Should self-installers of electric vehicle charging stations be exempt from certification?

Self- installers are not defined as per the NEC and should not have standing under the ICC.

3.) Should installers of electric vehicle charging stations that are not for commercial use be exempt from certification?

No, NEC and licensed electrical contractor provisions apply.

4.) Should installers of electric vehicle charging stations be subject to certification requirements based upon the number and type on installation performed? Should certification only be required for grouping of Level 2 charging station installations?

Certification should apply to all levels because of site assessment and NEC requirements. Indiscriminately “plugging in” or making electrical connections may lead to dangerous situations. Electrician/installers must possess the knowledge base to prevent overloads, short circuits, fires and to protect people and property.

Electric Vehicle Charging Station Electrician/ Installer certification should include the following topics:

- Electric vehicle types and manufacturers
- Electric vehicle supply equipment manufacturers products
- Level 1 and Level 2 EVSE

- Electric vehicle site assessment and load calculations
- Electric utility policy
- 2011 National Electric Code
- NEC ART
- Electric vehicle rules and regulations such as OSHA, NFPA 70E, ADA, etc.
- Renewable energy and electric vehicles
- First responder concerns

5.) Should installers of electric vehicle charging stations be subject to certification requirements based upon the electrical force or voltage that is transferred to the electric vehicle? For example, should certification only be required for a Level 3 or DC fast charge station installations?

Certification should apply to all levels of installation. If “qualified” certified electrician/installers are performing the work according to the NEC no further certification or action is required.

6.) What other types of installations, not referenced above, should be exempt from certification requirements?

Certification should be mandatory for all installations for the safety reasons per the NEC as outlined above and for the proper functioning of charging systems.

### **III. Required Application Filings and Procedures**

1.) Should certified installers be required to file notices of installation of each charging station and its location? How often-quarterly? After each installation? If so, what information should be provided in such notices?

A notice of installation should be filed by the licensed electrical contractor after each installation with the ICC and before installation with the utility.

The following information should include but not limited to:

- Type of occupancy: residential, commercial or industrial
- Establishing EVSE location
- Obtaining electric bills for the past 12 months
- Verify customer utility and customer rate
- Determine EVSE branch circuit requirements such as voltage, amperage of EVSE
- Verification of existing service for the availability to add EVSE branch circuits
- Perform electrical load calculations for services 150 amps or less that are going to add a Level 2 EVSE
- Determine electrical permit, zoning and legal property information
- One line diagram showing electrical panelboard, conduit run for EVSE, and EVSE equipment

2.)Should the customer have to provide the ICC or their utility with a certification that the entity/vendor installing the charging station was an entity certified by the ICC to install EV stations? If so, what information should be provided in such notices?

The licensed electrical contractor obtains a permit from the Authority Having Jurisdiction (AHJ) as mandated by the NEC. The contractor notifies the utility and the ICC. The customer should not be involved in the process.  
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he above necessary information should apply.

3.)Is it necessary for the Commission to issue an order granting or denying an application for a vendor to be certified to install an EV charging station?

The electrician/installer should be certified for knowledge base and liability issues. The electrical contractor should be licensed and bonded. Vendors should be licensed and bonded if they are acting as an electrical contractor. The electrician/installer should be certified through the ICC.

4.)Are there circumstances under which the Commission should require vendors to amend their certificates? If so, what are the circumstances?

The vendors should not be certified, if they act as electrical contractors the electrician/installers should be certified through the ICC.

#### **IV. General Certification Requirements**

1.) Should installers meet adequate training, financial, and competency requirements to be certified? If so, should certification requirements vary based upon the electrical force or voltage that is transferred to the electric vehicle or according to the number and type of installations performed? Electric Infrastructure Training Program (EVITP) is operational presently in Illinois and nationwide and referenced by the United States Department of Labor in Clean Cities literature.

Electric Infrastructure Training Program (EVITP) is operational presently in Illinois and nationwide and referenced by the United States Department of Labor in Clean Cities literature. Electric Vehicle Installer certification is based on a 30 contact hour minimum with classroom lecture and hands-on lab. Certification includes a comprehensive written exam. The potential installer candidate must score 75% or better on the written exam to receive Electric Vehicle Installer certification.

2.) Should installers be licensed to do business and be bonded in the State of Illinois in order to receive certification?

The electrician/ installer should not be required to be licensed and bonded to do business in the State of Illinois. The electrician/installer is typically an employee of an electrical contractor. If the electrician/installer is the owner of the electrical contracting business he/she must be licensed and bonded.

3.) How should the Commission ensure that installers that get certified have the requisite knowledge, skills, training, experience, and competence to perform functions in a safe and reliable manner?

The ICC should mandate that electric vehicle supply equipment electrician/installers complete formal electrical training such as EVITP referenced above. The electrician/installer should possess a verifiable skill set prior to coursework. The following should be the minimum electrical skills, knowledge, training and competency requirements..

The electrician (inside journeyman) who has completed a state or federally approved electrical apprenticeship program with a minimum of 8000 hours of On the Job training and a minimum of 720hours of related classroom and laboratory instruction.

A “qualified” electrician/installer as per the NEC and for liability issues requires prior experience and training

4.) Should the Commission impose reasonable certification fees and penalties on installers for failing to comply with its certification requirements?

Yes, the Commission should impose electric vehicle supply equipment electrician/ installer fees to defray administrative costs. The certification coursework should be under the existing EVITP umbrella. It is unnecessary for the Commission to be involved in training.

5.) Should all installers conform to applicable building and electrical codes?

Yes, a safe and proper installation of electric vehicle supply equipment will mandate that building and electrical codes will be strictly adhered to. Knowledge of ADA requirements is also important.

7.) Should all certified installers be required to ensure that all EV charging stations they install meet recognized industry standards as the Commission deems appropriate (e.g., NEC, IEEE, EPRI, DTE, UL, SAE, NIST)?

Yes. NEC 625.5 mandates that all electrical materials, devices, fittings and associated equipment that will be used in the installation of electric vehicle supply equipment be listed or labeled according to a third part national recognized certification party such as UL, ETL and the like. Electric vehicle supply equipment shall meet the safety and operational ratings set forth in the UL 2594, UL 2231-1, UL 2231-2, UL1998 and UL 991 standards. This is in addition to SAE requirements.